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of the occurrence of metabolism, even during the maturation or or growth of germs in the parent body, the contrary opinion being in conflict with fact.

The Lamarckian philosophy of transformism therefore offers the foregoing hypothesis of heredity as a substitute for the preposterous one of the isolation of germ-plasma, which, as here shown, is in the most obvious conflict with the principle of the conservation of energy. An isolated germ-plasma is as undemonstrable as the presence of bow-legged goblins in the moon. The primary postulate of that hypothesis is suicidal. There is no middle course to be taken. Biologists who commit themselves to an acceptance of the biological vagaries of Weismann array themselves against the modern rigorously scientific tendency to examine the problems of biology from the standpoint of the physicist.

In that the doctrine of the isolation of the germ-plasma is in irreconcilable conflict with the great cardinal principle upon which the whole fabric of modern physiological science rears its stately proportions, namely, with the general theory of metabolism, and, consequently, with the still more imposing and universal principle of the conservation of energy, we therefore realize what a colossal fabric of speculative rubbish must be consigned to the limbo of untenable and forgotten hypotheses in what is represented by the misguided labors af the advocates of the existence of an unalterable germ-plasma.—JOHN A. RYDER.

PHYSIOLOGY.

An Experimental Investigation of Strychnine Poisoning.—It is a known fact that certain organs extract certain substances from the blood. The kidney, for instance, takes up urea; the motor nerves have an elective affinity for curare, the nervous system for lead, etc. As regards any drug which particularly affects any organ, the question may arise whether the organ is affected because of a special attraction for the drug or because of a special susceptibility to its action. For example, does strychnine affect the spinal cord because the latter stores up a relatively larger quantity of it than other organs, or is the spinal cord more susceptible to its influence than is muscle, or liver, for instance? In order to throw light upon this subject, Dr. Lovett[1] has studied experimentally in the Harvard Physiological Laboratory the action of strychnine upon frogs.

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[1] *Journal of Physiology*, Vol. IX., p. 99.

A quantitative table was first constructed showing the time that various amounts of strychnine require to produce convulsions in frogs of known weight. A certain amount of a solution of strychnine sulphate was then injected into a frog, and after a stated time various organs, spinal cord, muscle, liver, brain, blood, etc., were removed and rubbed up with water to a fluid consistency. Given quantities of each of these were then injected into separate frogs, and from the time of the appearance of the convulsions, by comparison with the quantitative table, the relative amounts of the drug absorbed by the various organs of the first frog were calculated. The results go to show that the spinal cord takes up relatively more strychnine than any other organ. In the case of one frog—a typical one—the relative amounts of the drug in one gram of several organs were as follows: spinal cord, 1.52 mgr.; liver, .325 mgr.; muscle, .377 mgr. On comparing the relative amounts in the blood and cord it was found that after small doses the cord contained more than the blood, while the reverse obtained with large doses. This relation seems to be constant. From these experiments the question of the affinity of the spinal cord for strychnine seems to be answered most clearly. The susceptibility of its protoplasm to the drug is left undecided.—L. GOFF.

The Muscle Current.—Dr. R. Nicolaides, of the University of Athens, gives[1] the results of some observations with the capillary electrometer to determine the duration and law of disappearance of the muscle current. He finds that in the excised gracilis or sartorius of the frog the current falls away at first quickly, then more slowly, and very gradually disappears. The whole duration naturally varies, but is considerable, *e.g.*, 380 minutes (gracilis). The longitudinal section currents are very weak, and of shorter duration than those between longitudinal and transverse sections. His results show that the muscle current runs a course parallel to that of the muscle irritability, lasting as long as it lasts, and disappearing according to the same law as it disappears.—L. GOFF.

Effect of Atropin on the Chorda Tympani.—The two kinds of secretory fibres distinguished by Heidenhain in gland nerves have for some time enjoyed an undisputed right to existence. It has been recognized that there are "secretory" fibres, controlling the secretion of water and salts, and "trophic" fibres, controlling the elaboration of organic matter. It has, moreover, been suggested by Langley[1] that we must assume a third kind of fibre, which he calls "anabolic," to account for the formation of fresh substance in the gland cells. More recently, however, Langley[2] has studied the effect of atropin on the chorda tympani, and has obtained results which throw doubt on his own and Heidenhain's views. These results he sums up as follows:—"The various changes caused in the gland cells by nerve stimulation are all affected by atropin, and to approximately equal extents. When paralysis of the chorda occurs, it is a paralysis of the whole of its function with regard to the gland cells. In other words the phenomena of atropin poisoning give us indication of the existence of more than one kind of secretory nerve fibre in the chorda tympani." It should be observed that this last sentence puts the case too strongly. Langley's experiments indicate that the trophic and anabolic fibres may in some cases be paralyzed more completely than the secretory, though the degree of difference is slight; and the existence of the three kinds of fibres cannot yet be regarded as absolutely disproved.

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[1] Du Bois Reymond's *Archiv.*, 1889, p. 73.

Bayliss and Bradford,[3] who have worked on the electrical phenomena of the submaxillary gland, assert that stimulation of the secretory fibres causes the hilus of the gland to become positive to the outer surface, and stimulation of the trophic fibres makes the outer surface positive to the hilus. Since the first current is abolished by atropin sooner than the second, the presumption is that the secretory fibres are paralyzed sooner than the trophic. Langley, however, thinks that the two currents are due to the preponderance of, first, *physical*, and second, *chemical* changes in the gland cells, and that therefore the electrical phenomena are not incompatible with his results.—MARY A. JOHNSON.

Secretion of Salts in Saliva.—The power of choice exercised by a gland in the selection of substances offered it by the blood is little understood. Novi[4] brings forward facts that bear in a general way upon this point in studying the chlorine (*i.e.*, NaCl) contents of the submaxillary saliva of the dog. He finds this to vary with two factors, viz.: the rate of secretion, and the amount of NaCl present in the blood. If the latter remain the same, increasing the rate of secretion increases the percentage of Cl in the saliva, which confirms the results of Heidenhain and of Werther. Again, if the rate of secretion remain unchanged, increasing the quantity of NaCl in the blood, as by injection of a ten per cent. NaCl solution into the jugular vein, increases the Cl contents of the saliva. The Cl increase in the saliva is here more rapid than that of the blood. If both factors vary simultaneously, the results vary; but it seems that a moderate change in the NaCl contents of the blood can overcome a considerable change in the rate of secretion. The percentage of NaCl in the saliva reached as high as .627, but never equaled that of the blood.

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[1] *Journal of Physiology*, Vol. VI. p. 88.

[2] *Journal of Physiology*, Vol. IX., p. 55.

[3] *Proc. Roy. Soc.*, Vol. XL., p. 203, 1886.

[4] Du Bois Reymond's *Archiv.*, 1888, p. 403.

Langley and Fletcher in a paper presented to the Royal Society, and not yet printed,[1] while in general confirming the results of Novi, make a study of numerous other influences affecting the secretion of salts, such as dyspnœa, clamping the carotid, bleeding, pilocarpine, atropin, lithium citrate, potassium iodide and potassium ferrocyanide. "The general result of these experiments is to show that the secretion of water, of salts, and of organic substances are differently affected by different conditions, and that the percentage composition of saliva is determined by the strength of the stimulus, by the character of the blood, and by the amount of blood supplied to the gland. All, or nearly all, the arguments which have been adduced to prove that the secretion of organic substance is governed by special nerve-fibres, have their counterparts with regard to the secretion of salts, so that we might imagine at least three kinds of secretory fibres to be present. The experiments, on the whole, indicate that this complicated arrangement does not exist, but that the stimulation of a single kind of nerve-fibre produces varying effects according to the varying conditions of the gland cells."

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[1] See abstract in *Proceedings of Royal Society*, Vol. XLV., No. 273, p. 16.